GEN BUS 760: Business Data Technologies — *Fall 2021*

Instructor: Emaad Manzoor	**Teaching Assistant (TA):** Yang Gao
Instructor Email: emanzoor@wisc.edu	**TA Email:** ygao328@wisc.edu
Instructor Office: Grainger Hall 4284B	**TA Office:** Grainger Hall 4284A
Instructor Office Hours: By Appointment	**TA Office Hours:** By Appointment

Course Meeting Time, Location, Canvas Site:

- *Sec 010:* Tuesday, 2.30PM - 5.00PM
  Location: Grainger Hall 2335
  Canvas: canvas.wisc.edu/courses/272487

- *Sec 011:* Tuesday, 5.40PM - 8.10PM
  Location: Grainger Hall 2520
  Canvas: canvas.wisc.edu/courses/272490

Credits: 3

Instruction Modality: In-Person

Requisites: Graduate/Professional Standing

Course Designations: General Business

Course website with updated and detailed class schedule, readings, and other resources: http://emaadmanzoor.com/genbus760/f21/

In this course, you will learn how to engineer and architect scalable, resilient, and extensible business data analytics pipelines with modern data management technologies. You will develop expertise in ingesting data from various sources, loading data into data lakes and warehouses, designing data storage schemas, programmatically querying and analyzing warehoused data, and designing end-to-end data management architectures for both batch and streaming data.

Proficiency in Python programming (via GEN BUS 705, for example) is required for this course.

How Credit Hours are Met by the Course

This class meets for two, 75-minute class periods (back-to-back) each week over the semester and carries the expectation that students will work on course learning activities (reading, problem sets, studying, etc.) for about 3 hours out of the classroom for every class period. The syllabus includes more information about meeting times and expectations for student work.

Regular and Substantive Student-Instructor Interaction

Regular and substantive student-instructor interaction will be facilitated via direct instruction through weekly lectures and hands-on lab sessions, feedback provided for assigned homework exercises, and discussions/presentations organized for the course project.

Course Learning Outcomes

Upon completion of this course, students will be able to:

- Extract data from both structured or unstructured databases.

- Transform and combine data with other relevant information and load data into targeted systems such as data warehouses, data marts or analytical applications.

- Use Python to execute simple web scraping, mine data from social networks, and use libraries for advanced data analysis beyond simple descriptive analytics.

- Implement Online Analytical Processing (OLAP) and create multi-dimension data cubes.

- Execute social mining techniques and create valuable information from text-mining for decision-making.

- Discuss the current landscape in data warehousing, big data, and other emerging topics.

In addition, students will be be able to:

- Programmatically ingest data from various sources into un/semi-structured data lakes.

- Design data warehousing schemas tailored for given downstream analytics applications.

- Extract and analyze data from warehouses using SQL and Python (with Pandas).

- Design end-to-end architectures for both batch and streaming data that are performant, resilient to failures, and easily extendable to future downstream analytics applications.

Course Meeting Format [150 minutes weekly]

- **Lecture (60-90 minutes):** Lectures will be delivered via presentation slides, and cover both conceptual/abstract and practical/concrete data management issues.

- **Mid-lecture quiz & break (10 minutes):** The mid-lecture quizzes will be multiple-choice, online, and test students' understanding of the lecture just delivered.

- **Lab (50-80 minutes):** Lab sessions will involve hands-on coding. Laptops with working internet connections are required to fully participate in the lab sessions.

Grading

Your grade will depend on your total out of 250 points scored on following components:

- **Homework assignments (25 points each = 100 points total):** There will be 4 homework assignments to be completed individually and submitted on Canvas 2 weeks after their release. External sources may be consulted as long as they are cited.

- **Mid-lecture quizzes (5 points each = 50 points total):** There will be a short, multiple choice quiz to be submitted during each week's lecture <u>to be completed individually</u>, for a total of 12 - 13 quizzes. Only the 10 highest-scoring quizzes will count towards the final grade.

- **Course project (100 points total):** There will be a semester-long course project <u>to be completed in groups</u> (created by me on Canvas), with partial points awarded for completing each component of the project. The project description and scoring scheme will be detailed in the first lecture, and also shared as a document on the course website.

<u>There will be no separate points for attendance.</u> <u>There is no final exam.</u> Final letter grades will be assigned based on the <u>better</u> letter grade obtained from the following 2 schemes:

- The students' total score relative to others in their section: top 10% — A, next 25% — AB, next 25% — B, next 25% — BC, next 15% — C and below.

- The students' total score relative to the maximum score (250 points): above 80% — A, 70 - 80% — AB, 60 - 70% — B, 40 - 60% — BC, below 40% — C and below.

Attendance and Participation

<u>There will be no separate points for attendance.</u> However, it is important that you attend class to grasp the lecture concepts and interact with your colleagues and I, participate in the mid-lecture quizzes, and gain hands-on experience in the lab sessions. If you know you will be absent for a few consecutive lectures, please let me know. Questions are encouraged: the concepts discussed in this course are complex and best absorbed by engaging with them actively and critically.

Required Textbook, Software & Other Course Materials

There is no required textbook. Required and optional readings from external material (outside the lecture presentations) will be shared on the course website. A virtual machine will be provided with all the required software (will be compatible with any operating system).

Privacy of Student Records & the Use of Audio Recorded Lectures Statement

<u>Lecture materials and recordings for this course are protected intellectual property at UW-Madison.</u> Students in this course may use the materials and recordings for their personal use related to participation in this class. Students may also take notes solely for their personal use. If a lecture is not already recorded, you are <u>not authorized to record my lectures</u> without my permission unless you are considered by the university to be a qualified student with a disability requiring accommodation. [Regent Policy Document 4-1] Students may not copy or have lecture materials and recordings outside of class, including posting on internet sites or

selling to commercial entities. Students are also prohibited from providing or selling their personal notes to anyone else or being paid for taking notes by any person or commercial firm without the instructor's express written permission. Unauthorized use of these copyrighted lecture materials and recordings constitutes copyright infringement and may be addressed under the university's policies, UWS Chapters 14 and 17, governing student academic and non-academic misconduct.

Course Evaluations

UW-Madison uses a digital course evaluation survey tool called AEFIS. For this course, you will receive an official email two weeks prior to the end of the semester, notifying you that your course evaluation is available. In the email you will receive a link to log in to the course evaluation with your NetID. Evaluations are anonymous. Your participation is an integral component of this course, and your feedback is important to me. I strongly encourage you to participate in the course evaluation.

Diversity & Inclusion Statement

Diversity is a source of strength, creativity, and innovation for UW-Madison. We value the contributions of each person and respect the profound ways their identity, culture, background, experience, status, abilities, and opinion enrich the university community. We commit ourselves to the pursuit of excellence in teaching, research, outreach, and diversity as inextricably linked goals. The University of Wisconsin-Madison fulfills its public mission by creating a welcoming and inclusive community for people from every background — people who as students, faculty, and staff serve Wisconsin and the world.

Academic Integrity Statement

By virtue of enrollment, each student agrees to uphold the high academic standards of the University of Wisconsin-Madison; academic misconduct is behavior that negatively impacts the integrity of the institution. Cheating, fabrication, plagiarism, unauthorized collaboration, and helping others commit these previously listed acts are examples of misconduct which may result in disciplinary action. Examples of disciplinary action include, but is not limited to failure on the assignment/course, written reprimand, disciplinary probation, suspension, or expulsion.

While students are encouraged to discuss their homeworks and project with their colleagues, all submitted material must be written up in isolation (for homeworks) or with group members only (for the project). All sources consulted (including other students, websites, and publicly available code) must be cited. Plagiarism (reuse or adaptation of material from *uncited* sources) will be checked for and penalized to the maximum possible extent.

Accommodations for Students with Disabilities Statement

The University of Wisconsin-Madison supports the right of all enrolled students to a full and equal educational opportunity. The Americans with Disabilities Act (ADA), Wisconsin State Statute (36.12), and UW-Madison policy (UW-855) require the university to provide reasonable accommodations to students with disabilities to access and participate in its academic programs and educational services. Faculty and students share responsibility in the accommodation process. Students are expected to inform me of their need for instructional accommodations during the beginning of the semester, or as soon as possible after being approved for accommodations. I, will work either directly with you or in coordination with the McBurney Center to provide reasonable instructional and course-related accommodations. Disability information, including instructional accommodations as part of a student's educational record, is confidential and protected under FERPA. (See: McBurney Disability Resource Center).

Campus Mask Policy

We expect everyone on campus – students, faculty, staff, and visitors – to follow the reasonable and research-based measures we have in place to protect our community. Those who can wear a face covering but refuse to do so will be asked to leave the building. Any absence from class due to refusal to wear a mask will be treated by the instructor as an unexcused absence, with consequences as indicated on individual class syllabi. Students who repeatedly fail to comply will be referred to the Office of Student Conduct and Community Standards and may be subject to disciplinary action under the non-academic misconduct policy. Students who have a medical condition or disability that affects their ability to wear a face-covering should obtain an accommodation.

Last updated: August 2021